

WHAT IS CLAIMED IS:

1 1. A converter circuit, comprising:
2 an AC-to-DC converter, comprising a plurality of first power devices;
3 a resonant DC link, comprising at least one auxiliary power device;
4 a DC-to-AC converter, comprising a plurality of second power devices; and
5 DC link lines, coupling the AC-to-DC converter, the resonant link, and the DC-
6 to-AC converter, wherein
7 the auxiliary power device is coupled between the DC link lines.

1 2. The converter of Claim 1, wherein the plurality of first power devices
2 comprise:
3 first power devices selected from the group of MOS-FETs and npn bipolar
4 transistors.

1 3. The converter of Claim 2, wherein the plurality of first power devices
2 comprise:
3 first power diodes, coupled across corresponding first power transistors.

1 4. The converter of Claim 3, wherein the first power diodes being coupled
2 across the first power transistors comprises a first power diode being coupled between a
3 source and a drain of a MOS-FET first power transistor.

1 5. The converter of Claim 3, wherein the first power devices are coupled
2 pair-wise in series to form a plurality of first arms.

1 6. The converter of Claim 5, wherein the AC-to-DC converter comprises at
2 least one of three first arms and simple rectifiers, generating an essentially DC voltage.

1 7. The converter of Claim 5, further comprising:
2 first terminals coupled to corresponding first arms, the first terminals operable to
3 receive AC power from an AC power source.

1 8. The converter of Claim 1, wherein the plurality of second power devices
2 comprise:

3 second power transistors selected from the group of MOS-FETs and npn bipolar
4 transistors.

1 9. The converter of Claim 8, wherein the plurality of second power devices
2 comprise:

3 second power diodes, coupled across corresponding second power transistors.

1 10. The converter of Claim 9, wherein the second power diodes being
2 coupled across the second power transistors comprises a second power diode being
3 coupled between a source and a drain of a second MOS-FET power transistor.

1 11. The converter of Claim 9, wherein the second power transistors are
2 coupled pair-wise in series to form a plurality of second arms.

1 12. The converter of Claim 11, wherein the DC-to-AC converter comprises
2 three second arms.

1 13. The converter of Claim 11, further comprising:
2 second terminals coupled to corresponding second arms, the second terminals
3 operable to provide AC power to a load.

1 14. The converter of Claim 1, wherein the DC-to-AC converter comprises:
2 a resonant capacitor;
3 an equivalent power diode; and
4 an equivalent switch; wherein
5 the resonant capacitor, the equivalent power diode, and the equivalent
6 switch are coupled:
7 between the DC link lines; and
8 parallel with each other.

1 15. The converter of Claim 1, wherein the auxiliary power device of the
2 resonant DC link comprises:
3 an auxiliary power transistor, selected from the group of MOS-FETs and npn
4 bipolar transistors.

1 16. The converter of Claim 15, wherein the auxiliary power device of the
2 resonant DC link comprises:
3 an auxiliary power diode, coupled across the auxiliary power transistor.

1 17. The converter of Claim 1, wherein:
2 the auxiliary power device is not coupled into the DC link lines.

1 18. The converter of Claim 16, wherein the resonant DC link comprises:
2 a first capacitor, coupled in series with the auxiliary power device;
3 a resonant capacitor, comprising parasitic capacitors of the power devices;
4 an inductance, coupled in parallel with the auxiliary power device and the first
5 capacitor, the inductance forming a resonant circuit with the resonant capacitor; and
6 a second capacitor, coupled in series with the switching LC resonator.

1 19. The converter of Claim 18, outputting an output voltage between the DC
2 link lines, wherein the output voltage is essentially clamped to the sum of the voltage
3 across the first capacitor and the voltage across the second capacitor.

1 20. A method of operating a converter circuit, the converter circuit
2 comprising an AC-to-DC converter, a resonant DC link, comprising at least one
3 auxiliary power device, a DC-to-AC converter, and DC link lines, coupling the AC-to-
4 DC converter, the resonant link, and the DC-to-AC converter, wherein the auxiliary
5 power device is coupled between the DC link lines, the method comprising:
6 switching the auxiliary power device with an essentially zero voltage switching
7 condition.